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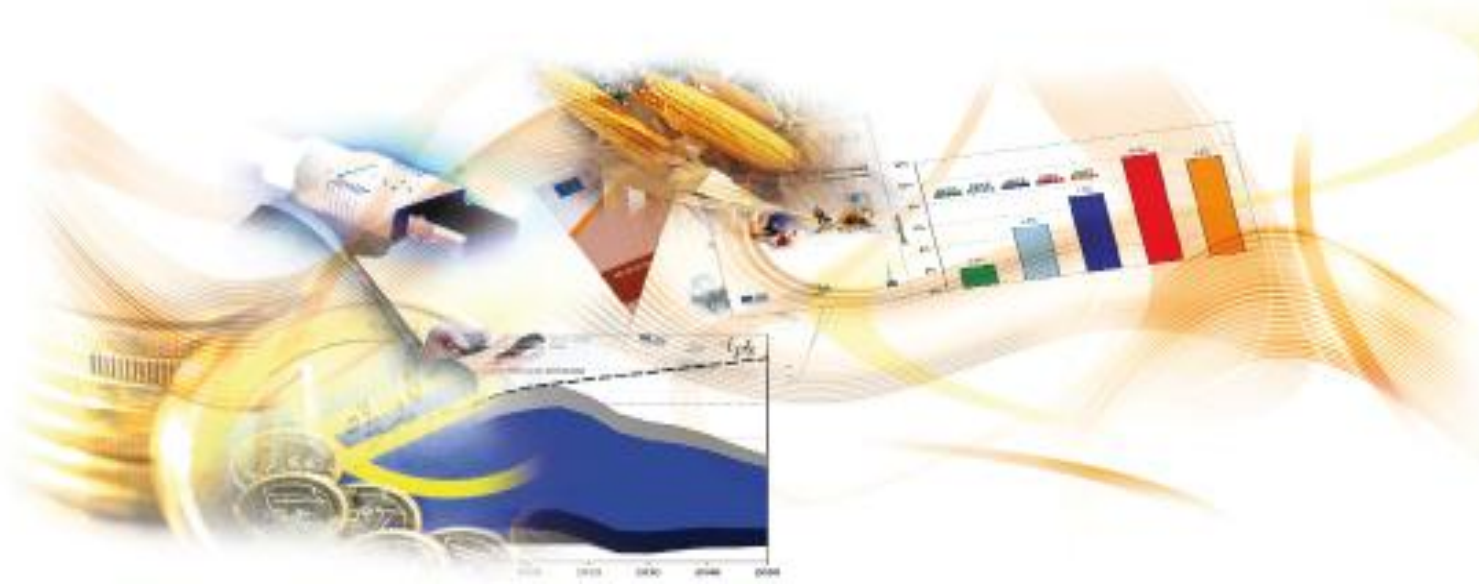

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The Country Report 2012 builds on and updates the 2011 edition. The report identifies the structural challenges of the national research and innovation system and assesses the match between the national priorities and the structural challenges**,** highlighting the latest developments, their dynamics and impact in the overall national context.

The first draft of this report was produced in December 2012 and was focused on developments taking place in the previous twelve months. In particular, it has benefitted from the comments and suggestions of Ruslan RAKHMATULLIN from JRC-IPTS. The contributions and comments from the Department of Jobs, Enterprise and Innovation, Ireland are also gratefully acknowledged.

The report is currently only published in electronic format and is available on the ERAWATCH website. Comments on this report are welcome and should be addressed to jrc-ipts-erawatch-helpdesk@ec.europa.eu.

EXECUTIVE SUMMARY

Ireland has been severely affected by the economic crisis. Gross Domestic Product (GDP) fell sharply during the period 2009-2011. In November 2010, the Irish Government accepted a €67.5b joint support programme from the European Union and International Monetary Fund.

Gross expenditure on Research and Development (GERD) declined from €2.838b in 2009 to €2.741b in 2011 with GERD as a percentage of GDP declining from 1.76% in 2009 to 1.72% in 2011 (the equivalent average EU-27 ratio in 2011 was 2.01%).

Spending by the enterprise sector on Research and Development (BERD) fell from €1.433b in 2009 to €1.317b in 2011, a decline of €0.116b or 8 per cent; BERD as a percentage of GDP rose fractionally from 1.16% in 2009 to 1.17% in 2011. Foreign-owned companies, predominantly in high tech sectors such as ICT and Life Sciences, account for seventy per cent of BERD.

Government budget appropriations or outlays for research and development (GBAORD) also fell, from €941m in 2009 to €823m in 2011 with GBAORD as a percentage of GDP declining from 0.57% in 2009 to 0.54% in 2011.

The higher education sector is an important performer of R&D accounting for 27.5% of GERD in 2011. However, research performed by the seven universities and the network of Institutes of Technology as a percentage of GERD has been falling; it was 29.2% in 2009, a decline of 1.7 percentage points on the 2011 figure. Ireland's Public Research Organisation (PRO) sector is relatively small by European standards; research carried out by PROs accounted for 4.8% of GERD in 2011, a slight decline on the 2009 figure of 4.9%.

The main structural challenges faced by the national system include the following:

- The dual nature of the enterprise sector: on one hand, large foreign owned high technology companies and, on the other, a large number of indigenous SMEs operating in low and medium technology sectors. The challenge for policy-makers is to get the former to undertake more R&D while seeking to encourage SMEs that do not innovate to become involved in research and innovation;
- Low levels of formal collaboration: recent policy reports have highlighted the low levels of linkages between higher education institutions and enterprises;
- Low absorptive capacity of indigenous SMEs: the new Government is committed to the development of a network of Technology Centres to address applied technological research issues;
- Lack of clarity and consistency in the national IP regime: A new national IP protocol has been published to enhance transfer of publicly-funded IP to the enterprise sector;
- Insufficient early-stage Venture Capital funding: the Government has introduced a number of new initiatives to address VC and credit availability to SMEs.

The 2012 update to the *National Reform Programme for Ireland* states that Ireland's headline target for R&D is to improve the conditions for research and development, in particular with the aim of raising combined public and private investment levels in this sector to 2.5% of GNP (approximately equivalent to 2.0% of GDP).

There have been significant changes in Irish research and innovation policies. Previous policies focused on enhancing the scientific, technological and innovative capacity of the enterprise

sector and the country as a whole. This was based on an two-pronged strategy of investing in people, infrastructure and associated facilities to build the science base across many areas of scientific research in both higher education institutions and other public research organisations; and direct support to the enterprise sector to help individual companies to build their capacity for research and development.

The new policy emphasis seeks to move towards a more top-down, targeted approach and recognises that Government investment in research is likely to remain under severe pressure ahead, and yet research needs to play a central role in the Government's economic strategy. The new policy approach as enunciated in the Government's research prioritisation strategy aims to focus investment in those areas that are most likely to give demonstrable returns in the medium term. Fourteen priority areas have been identified which, along with six underpinning platform technologies and certain integrating infrastructure, will become the focus of the majority share of competitive State funding in research for the next five years.

As the new policy approach emphasises the funding of research that can demonstrate societal and economic impact, there is a renewed policy focus on stronger HEI-industry linkages in order to enhance the commercialisation of publicly-funded research. The Government has also taken steps to enhance the attractiveness of the R&D tax credit, particularly to overseas companies.

Future funding for research centres will involve a smaller number of centres in areas aligned with the 14 areas identified in the research prioritisation strategy. It is also envisaged that future funding will be geared ultimately towards the development of Research and Technological Organisations, focusing on applied research directed at medium-term industry needs. The Government is proposing its National Research Prioritisation Exercise — the report of which formed the foundation stone for its research prioritisation strategy — as the basis for its smart specialisation strategy.

A number of Government reports have identified public procurement and the development of inter-firm networks as potential policy initiatives that could be deployed to foster innovation, particularly among SMEs. Future policy initiatives should also aim at addressing Ireland's weakness in relation to patents performance.

New research and innovation governance structures have been established with a new committee, the Prioritisation Action Group, reporting to the Cabinet Sub-Committee on Economic Recovery and Jobs on the implementation of the research prioritisation strategy. Other changes, largely driven by fiscal constraints, include the merger of the Irish Research Council for the Humanities and Social Sciences and the Irish Research Council for Science, Engineering and Technology into a single body, the Irish Research Council (IRC), and the abolition of the separate Office of the Chief Scientific Adviser. The duties of the chief scientific adviser were conferred on the current Director General of Science Foundation Ireland (SFI), in addition to his existing role, and co-terminous with his tenure, as Director General of SFI.

Ireland is an enthusiastic supporter of the European Research Area and perceives a strong synergy between national policies and ERA-related policies. The Government has set ambitious targets for Irish participation and financial draw-down in FP7 and the available data indicate that these targets are likely to be achieved.

TABLE OF CONTENTS

1. Introduction 5
2. Recent developments of the research and innovation policy and system 8
   2.1 National economic and political *8*
   2.2 Funding trends *8*
   2.3 New policy measures *9*
   2.4 Recent policy documents *10*
   2.5 Research and innovation system changes *10*
   2.6 Regional and/or National Research and Innovation Strategies on Smart Specialisation (RIS3) *11*
   2.7 Evaluations, consultations *13*
   2.8 Policy developments related to Council Country Specific Recommendations *14*
3. Structural challenges facing the national system 15
4. Assessment of the national innovation strategy 19
   4.1 National research and innovation priorities *19*
   4.2 Evolution and analysis of the policy mixes *20*
   4.3 Assessment of the policy mix *23*
5. National policy and the European perspective 26
References 28
List of Abbreviations 29

1. INTRODUCTION

Ireland is a Member State with a small population, 4.58m in 2011, compared to most EU Member States; it accounts for less than 1% of the total EU population.

There are significant challenges facing Ireland as a result of the economic and financial crisis; Gross Domestic Product (GDP) declined by 5.5% in 2009 and by 0.8% in 2010. There was a small recovery in 2011 of 1.4%; however, when measured by Gross National Product (GNP), a more reliable indicator of Irish economic performance, the Irish economy declined by 2.5% in 2011. The economy is expected to show small growth in 2012 (anticipated at 0.4% of GDP) on the back of a strong export performance.

Unemployment is a significant issue and at the end of November 2012 the standardised unemployment rate stood at 14.6%.

Since November 2010, Ireland has been participating in a joint support programme organised by the EU and International Monetary Fund.

Eurostat data indicate that gross expenditure on Research and Development (GERD) as a percentage of GDP declined slightly from 1.76% in 2009 to 1.72% in 2011[1]. The national 2020 target is 1.77%. Total GERD amounted to €2,741m in 2011, a drop of €97m on the 2009 figure of €2,838m.

GERD per capita in Ireland declined from €638 in 2009 to €611 in 2011. However, for both years, it was significantly larger than the EU27 average (€474 in 2009 and €510 in 2011).

Business expenditure on Research and Development (BERD) showed a slight decline from €1,868m in 2009 to €1,855m in 2011, though BERD as a percentage of GDP increased fractionally from 1.16% in 2009 to 1.17% in 2011.

The most recent BERD statistics for 2009-2010 show that in excess of 80% of total research and development expenditure was concentrated in four sectors: Manufacturing, Information and communication services, Real estate activities and Professional, scientific and technical activities[2].

The Central Statistics Office publication, *Business Expenditure on Research and Development 2009/2010*, indicates that foreign owned enterprises spent over €1.3b on research and development, which was almost 70% of all research and development expenditure, while Irish owned enterprises spent €563m. Current expenditure accounted for 82% of all spending by foreign owned enterprises compared to 84% for Irish owned enterprises.

The 2012 *EU Industrial R&D Investment Scoreboard*[3] publication indicates Ireland occupies 10th place of the 27 member states for industrial investment in R&D, accounting for 14 companies out of the 1,000 top EU companies for R&D investment.

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1 Eurostat:
http://epp.eurostat.ec.europa.eu/portal/page/portal/science_technology_innovation/data/main_tables

2 Central Statistics Office and Forfás:
http://www.cso.ie/en/media/csoie/releasespublications/documents/informationtech/2010/berd10.pdf

Eurostat data shows that Business sector amounted to 67.7% of GERD in 2011 with the Government and Higher Education sectors accounting for 4.8% and 27.5% respectively.

Within the higher education sector, the seven universities are the dominant research performers though the Institutes of Technologies are making rapid gains. Teagasc, the agricultural advisory and research organisation, is the largest public sector research organisation; in 2011, it had an R&D budget of €50m.

In terms of university rankings, the results of the *Times Higher Education World University Rankings 2012-2013* indicate that the two leading Irish universities have seen a fall in their rankings. Both Trinity College Dublin (110) and University College Dublin (187) are no longer in the top 100 ranking that they attained in 2010-2011. In the *QS World University Rankings 2012*, however, Trinity College Dublin was ranked 67 while University College Dublin was ranked 131.

The National Competitiveness Council's *Ireland's Competitiveness Scorecard 2012* report indicates that Ireland performs strongly in dimensions relating to human resources for research and innovation. The available data indicate that the total number of researchers (full time equivalent) for every 1,000 people in employment in Ireland in 2009 was 7.6, well ahead of the EU average of 6.8.

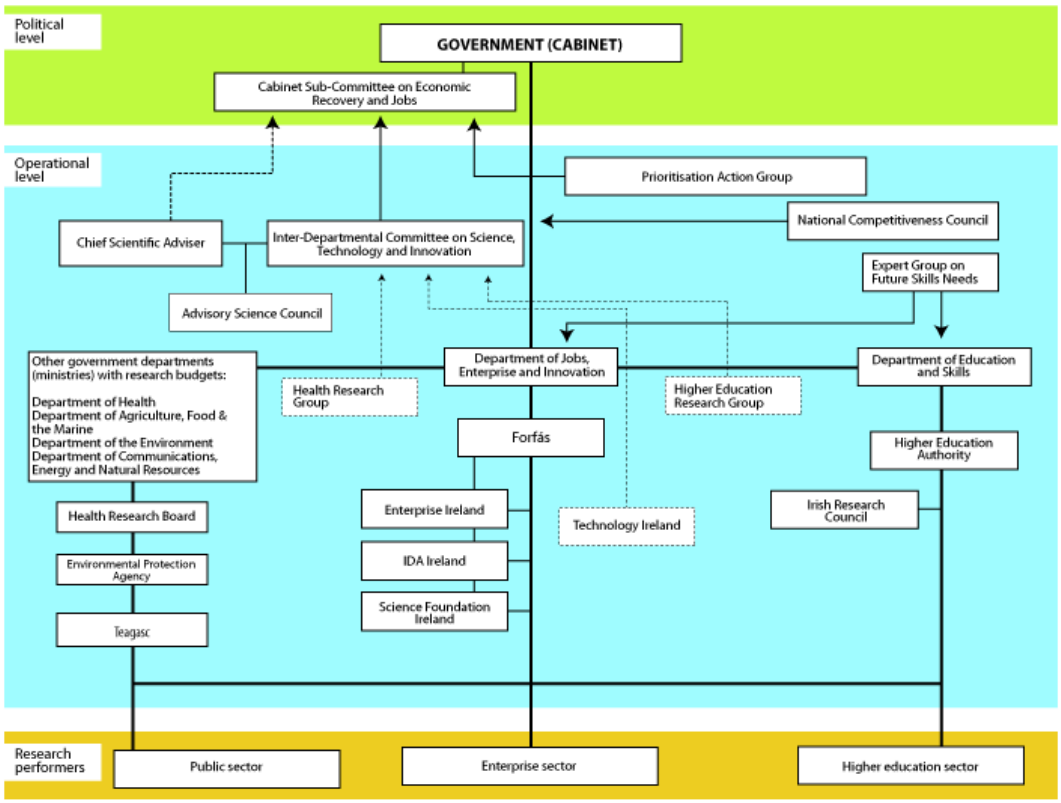
In 2009, Ireland had 0.27 PhD graduates per 1,000 population — slightly above the OECD average. In 2009, according to statistics published by the Higher Education Authority, 1,205 students graduated with PhDs — this increased to 1,447 in 2011.

There have been a number of changes in the research and innovation governance system during the past two years, largely as a result of the economic crisis. A new cabinet subcommittee, the Cabinet Sub-Committee on Economic Recovery and Jobs, has subsumed the roles and activities of the Cabinet Sub-Committee on Science, Technology and Innovation. A new committee, the Prioritisation Action Group, has been established to oversee the implementation of the research prioritisation strategy and it has largely superseded governance structures established to oversee the implement the Strategy for Science, Technology and Innovation 2006-2013. Other changes include the merging of the Irish Research Council for the Humanities and Social Sciences and the Irish Research Council for Science, Engineering and Technology into a single body, the Irish Research Council (IRC), and the abolition of the Office of the Chief Science Adviser as a separate organisation.

The two main ministries with responsibility for research and innovation policy are the Department of Jobs, Enterprise and Innovation and the Department of Education and Skills. Key implementing bodies include Science Foundation Ireland, Enterprise Ireland and IDA Ireland (under the aegis of the Department of Jobs, Enterprise and Innovation) and the Higher Education Authority and IRC (under the aegis of the Department of Education and Skills).

3 European Union/Joint Research Centre:
http://iri.jrc.ec.europa.eu/reports.htm

THE STRUCTURE OF THE RESEARCH AND INNOVATION SECTOR IN IRELAND



(Source: Official Government documents and interviews with government officials)

Ireland is a unitary state and is divided into two NUTS II regions for Structural Funds planning purposes: the Southern and Eastern Region (S&E) and the Border, Midlands and Western Region (BMW). Two regional assemblies, the S&E and the BMW Regional Assemblies, are the managing authorities for regional Operational Programmes.

STI policy is highly centralised in Ireland; the regions have no involvement in policy formulation and their implementation role in relation to STI policies is limited.

2. RECENT DEVELOPMENTS OF THE RESEARCH AND INNOVATION POLICY AND SYSTEM

2.1 National economic and political

Ireland is experiencing severe economic conditions, with Gross Domestic Product (GDP) having decreased significantly during the period 2009-2010. The country is participating in a €85b financial assistance package agreed with the EU and the International Monetary Fund in November 2010, the purpose of which is to return the Irish economy to sustainable growth and to ensure that Ireland has a properly functioning healthy banking system.

The Government which came into power in February 2011 and which is a coalition of Fine Gael and the Labour Party is also seeking to tackle unemployment which has risen from 4.5% in 2007 to over 14% in 2012[4].

Though domestic demand is very weak, modest growth is forecast for 2012 and 2013 largely on the back of a growth in exports. Ireland now enjoys a large surplus on its current account.

2.2 Funding trends

Eurostat data show that GDP fell by 5.5% in 2009 and by 0.8% in 2010. There was a small recovery in GDP during 2011 of 1.4%; however, when measured by Gross National Product, a more reliable indicator of Irish economic performance, the economy declined by 2.5% in 2011.

Gross expenditure on Research and Development (GERD) fell from €2,838m in 2009 to €2,741m in 2011 and declined as a percentage of GDP from 1.76% in 2009 to 1.72% in 2011. Ireland's 2020 target for GERD as a percentage of GDP is 2.0% or 2.5% of GNP.

Government appropriations for research and development (GBAORD) decreased from €941m in 2009 to €823m in 2011; GBAORD as a percentage of GDP fell from 0.57% in 2009 to 0.54% in 2011.

Business expenditure on R&D (BERD) decreased from €1,868m in 2009 to €1,855m in 2011; however, BERD expressed as a percentage of GDP showed a fractional increase over the period 2009-2011 (from 1.16% in 2009 to 1.17% in 2011).

Research performed by higher education institutions declined as a percentage of GDP from 29.2% in 2009 to 27.5% in 2011.

R&D performed by public research organisations as a percentage of GDP registered a small decrease from 4.9% in 2009 to 4.8% in 2011.

4 Department of Public Expenditure and Reform/Central Expenditure Evaluation Unit (2012), Labour Market Activation and Training
http://per.gov.ie/wp-content/uploads/Labour-Market-Training-and-Activation.pdf

	2009	2010	2011	EU27
GDP growth rate	-5.5	-0.8	1.4	- 0.3 (2012)
GERD (% of GDP)	1.76	1.71	1.72	2.03s (2011)
GERD (euro per capita)	637.7	598.2	611.8	510.5s (2011)
GBAORD - Total R&D appropriations (€ million)	941	827	823	91,277.1 (EU27 total 2011)
R&D funded by Business Enterprise Sector (% of GDP)	1.16	1.17	1.17	1.26 (2011)
R&D performed by HEIs (% of GERD)	29.2	26.5	27.5	24% (2011)
R&D performed by Government Sector (% of GERD)	4.9	4.9	4.8	12.7% (2011)
R&D performed by Business Enterprise Sector (% of GERD)	65.8	68.6	67.7	62.4% (2011)
Share of competitive vs institutional public funding for R&D	n.a.	n.a.	n.a.	n/a

s - EUROSTAT estimate
Data Source: EUROSTAT, March 2013

2.3 New policy measures

There have been a number of new policy measures, the most significant of which in terms of research and development has been the publication in March 2012 of the Government's research prioritisation strategy. The new strategy seeks to ensure the future alignment of competitive public investment by research funders with the 14 priority areas and 6 underpinning platform technologies identified by a high-level Government-appointed steering group. The strategy is being implemented by a newly established Prioritisation Action Group and has the potential to significantly impact on public sector funding of research and innovation.

Also in 2012, the Government published a new National Intellectual Property Protocol[5] the purpose of which is to help the enterprise sector to access the research done in Ireland's universities, institutes of technology and other public research institutions.

A further initiative to ensure the effectiveness of the State's R&D investment was the Government approval in January 2012 for the drafting of legislation to extend the remit of Science Foundation Ireland to include funding of applied research in order to support the development of research findings into commercial opportunities.

There have been two measures to increase the numbers of students taking science, technology, engineering and mathematics subjects:

1. The seven universities, together with Dublin Institute of Technology and the Royal College of Surgeons in Ireland, and the Institutes of Technology have collectively

5 Department of Jobs, Enterprise and Innovation (2012): Putting public research to work in Ireland, Dublin, Ireland http://www.djei.ie/publications/science/2012/Intellectual_Property_Protocol_Putting_Public_Research_to_Work_for_Ireland.pdf

decided to operate a bonus points scheme for Higher Level Mathematics for a four-year trial period from 2012 to 2015 inclusive, with a review in 2014.

2. The Project Maths programme, the revised mathematics syllabuses for lower and upper second level education, commenced in all schools in September 2010. Project Maths places much greater emphasis on student understanding of mathematical concepts, with increased use of contexts and applications to relate mathematics to everyday experience.

2.4 Recent policy documents

The *Government's Action Plan for Jobs 2012* (published in February 2012), which sets out its objective of having two million people in work by 2020, seeks to support economic growth and job creation. The Action Plan contains a number of measures such as improved access to finance for small businesses, a reduction in costs and red tape and supports for exports, management and innovation. Many of the actions included in the Action Plan were identified in the Programme for Government, the *Programme for National Government 2011-2016*, published by the new Government when it took office in March 2011.

A recent policy document that is likely to have a profound change in Ireland's research and innovation landscape is the *Report of the Research Prioritisation Steering Group*. Published by the Government in March 2012, the report identified 14 priority areas and 6 underpinning platform technologies around which future investment in competitive publicly-performed research should be based. The Steering Group also recommended how the priority areas should be implemented within the wider science, technology and innovation system. It is anticipated that the national research prioritisation strategy will impact on a number of programme expenditure areas such as R&D funding programmes and education/training.

The Government also in 2012 published a new National Intellectual Property Protocol which seeks to give clarity about terms on which enterprises can access intellectual property created in the HEI and PRO sectors.

The Advisory Council for Science, Technology and Innovation (ACSTI) published a report in July 2012, *Sustainability of Research Centres*, which reviewed the State supported research centre sector with a view to maximising the economic impact of taxpayers' investment in research, development and innovation. The report envisaged a smaller number of research centres in the future and these would be aligned with the 14 priority areas identified in the research prioritisation strategy.

The ACSTI report made a number of recommendations aimed at optimising the return on State investment from research centres. The recommendations included the development of Research and Technological Organisations (RTOs) as a natural part of the progression in developing a well-rounded national innovation system. The report noted that RTOs are focused on applied research directed at medium term industry needs as well as shorter-term technology development and technical services for industrial clients.

2.5 Research and innovation system changes

Government also announced that it was proceeding with its decision to merge Forfás, the policy and advisory board for enterprise, trade, science, technology and innovation, into its parent ministry, the Department of Jobs, Enterprise and Innovation.

Forfás had been responsible for managing the Discover Science and Engineering (DSE), the national science promotion programme, on behalf of the Department of Jobs, Enterprise and Innovation. Responsibility for the management of DSE transferred to Science Foundation Ireland in 2012.

The two research councils, the Irish Research Council for the Humanities and Social Sciences (IRCHSS) and the Irish Research Council for Science, Engineering and Technology (IRCSET), were merged into a single body, the Irish Research Council, which had its inaugural meeting in March 2012. The new Council will continue the work of the two previous research councils in the funding of research and graduate education in Ireland.

In 2012, the Government announced as part of its *Jobs Action Plan 2012* that it was establishing a central Technology Transfer Office (cTTO), that would act as a 'one stop shop' for industry engagement with the research system to find all research opportunities and IP that has been generated across the entire publicly funded research system. The cTTO will be hosted by Enterprise Ireland and will work closely with existing Technology Transfer Offices.

The Government has published the Bill to extend the remit of Science Foundation (SFI) to enable it to fund applied research in addition to its existing area of responsibility of funding basic research. The proposed legislation would also enable SFI to participate in certain EU and international funding programmes.

2.6 Regional and/or National Research and Innovation Strategies on Smart Specialisation (RIS3)

Irish policy-makers recognise the importance attaching to the concept of smart specialisation and note that the European Commission's focus on smart specialisation as a means of achieving the objectives of Europe 2020 and also the OECD in terms of its "innovation for growth" agenda. Ireland is not currently participating in the EU's Smart Specialisation or S^3 Platform though Northern Ireland has registered as a Registered Region.

The Irish Government is positioning its National Research Prioritisation Exercise (NRPE) — which it commenced in 2010 — as the basis for its smart specialisation strategy. The objectives of the NRPE were:

- To identify a number of priority areas around which Government investment awarded on a competitive basis in research should be focused;

- To identify the areas with the greatest potential to contribute to enterprise development, economic development, job creation and retention as well as addressing quality of life. The focus has been specifically on research that is supported by the Government with the ultimate aim of contributing to economic development while also acknowledging the other important reasons for supporting research;

- To identify some of the supporting fields of science and technology that could contribute to the priority areas. The Government wanted researchers across all disciplines, including researchers in the arts, humanities and social sciences, to examine the contribution that their research can make to these priority areas.

Policy-makers have emphasised the importance of the process underpinning the prioritisation project. The Government appointed a high-level group chaired by a leading businessman with representatives from business, academia and Government. Forfás, the national policy and advisory board for enterprise, trade, science, technology and innovation, provided secretariat support to the group.

As part of the process, a significant amount of time was allocated by the group to deliberating the appropriate balance for a prioritisation exercise at this point in the evolution of the Irish R&D system. The exercise sought to balance on one hand being specific enough so that a critical mass could be built in a focused number of areas while on the other hand avoiding being so specific that the group would end up doing the job of research funding agencies and scientists. The group also devoted a considerable amount of time to defining a set of criteria to help bring objectivity and consistency to the prioritisation exercise.

The group decided on the following four high-level criteria for assessing priority areas:

1. The priority area is associated with a large global market or markets in which Irish-based enterprises already compete or can realistically compete;

2. Publicly performed R&D in Ireland is required to exploit the priority area and will complement private sector research and innovation in Ireland;

3. Ireland has built or is building (objectively measured) strengths in research disciplines relevant to the priority area;

4. The priority area represents an appropriate approach to a recognised national challenge and/or a global challenge to which Ireland should respond.

The group gathered evidence for each of the criteria concerned by undertaking detailed studies, by consulting with industry and the research community and drawing on relevant expertise for each of the areas being put forward for evaluation. At an early stage it reviewed with Government departments and agencies responsible for research and development in the science and technology area, what was currently happening. This helped to confirm to the group that the prioritisation exercise was more about sharpening focus rather than putting a new system in place. Finally, the group consulted and validated its proposals with experts in thematic working groups and with a wide a wide group of scientific and business stakeholders before finalising the prioritisation.

The group identified 14 priority areas and 6 underpinning platform technologies that the Government would focus its future investment in publicly-funded research awarded on a competitive basis so as to maximise economic outcomes.

There are three areas in ICT: Future Networks and Communications; Data Analytics, Management, Security and Privacy; Digital Platforms, Content and Applications.

Six of the targeted areas are in life, health and food: Connected Health and Independent Living; Medical Devices; Diagnostics; Therapeutics Synthesis, Formulation, Processing, and Drug Delivery. There is also Food for Health; Sustainable Food Production and Processing.

There are two areas focusing on energy, Marine Renewable Energy; Smart Grids and Smart Cities. On the industry side there are Manufacturing Competitiveness; Processing Technologies and Novel Materials; Innovation in Services and Business Processes.

Policy-makers point out that the plan was and is that the majority of competitive research funding in the future would go to the areas identified and the underpinning science and technology that supports them. At the same time, there is room to fund research for reasons other than its direct economic impact; these include funding research for policy and knowledge creation and supporting the early stage training of researchers in disciplines outside the 14 priority areas. All of these are part of a sustainable science, technology and innovation ecosystem and this is reflected in research prioritisation report.

2.7 Evaluations, consultations

There has been no dedicated or systematic evaluation of the research and innovation system in Ireland. However, the work of the Research Prioritisation Steering Group can be regarded as a very extensive investigation of public funding for research and innovation and the work of the Prioritisation Action Group has involved significant consultation with research performers in the HEI and PRO sectors.

The Steering Group in its report made a number of recommendations aimed at bringing about a step change in the efficiency and effectiveness of the current STI system including that the Government should re-state its objectives for science, technology and innovation policy with clear goals and metrics for each policy element. It also recommended that policy goals and objectives that are set should be underpinned by a set of national indicators that reflect the goals and objectives and this should include indicators of economic impact. Work is currently underway to deliver on these recommendations.

In 2011, Forfás published an evaluation framework for enterprise supports. This evaluation framework which was developed having regard for international best practice sets out the methodologies and approaches to ensuring maximum coherence and comparability across evaluations carried out on entrepreneurship, R&D/innovation and business development support measures.

It is intended that the framework will assist policy-makers and enterprise support programme developers to assess the value of policy interventions, achieve continued improvements in the design and implementation of support measures, and strengthen the evaluation culture in enterprise support provision.

The new evaluation framework applies to all support measures provided by the agencies under the aegis of the Department of Jobs, Enterprise and Innovation such as SFI and Enterprise Ireland. To date, a number of support measures have been evaluated under the new framework including the impact evaluation of SFI's Centres for Science, Engineering and Technology (CSET) support measure.

In early 2012, Forfás completed the evaluations for start-up and entrepreneurship supports and progressed those relating to R&D/innovation, which are scheduled for completion in early 2013.

2.8 Policy developments related to Council Country Specific Recommendations

This section is not applicable as no Council Country Specific Recommendations were made for Ireland.

3. STRUCTURAL CHALLENGES FACED BY THE NATIONAL SYSTEM

The main structural challenges facing the Irish research and innovation system include the following:

Dual nature of Irish enterprise sector
Ireland is characterised by, on one hand, large foreign-owned high technology companies and, on the other, a large number of indigenous SMEs operating in low and medium technology sectors. The challenge for policy-makers is to get the former to undertake more R&D while seeking to encourage SMEs that do not innovate to become involved in research and innovation.

The *Innovation Union Competitiveness Report 2011*[6] notes the large presence of foreign multinational companies in Ireland which account for a large share of Irish scientific and technological performance and which contribute to the positive manufacturing trade balance in high-tech and medium high-tech products. The report points out that in 2007, foreign R&D expenditure (mainly by US companies) represented 70% of Irish business R&D expenditures. The report also suggests that in relation to business expenditure on R&D in Ireland smaller firms had more difficulty than large firms in maintaining their R&D investment.

The *Innovation Union Scoreboard 2011*[7] report states that in relation to Ireland a strong decline was observed among SMEs introducing product or process innovations. It also highlights that along with Austria and Poland the share of SMEs innovating in-house has been declining rapidly in Ireland.

Low levels of formal cooperation
A number of recent policy reports have highlighted the low levels of formal linkages between higher education institutions and enterprises, particularly SMEs.

The *Innovation Union Competitiveness Report 2011* points out that the intensity of contractual R&D collaboration is low in Ireland (under 0.002% of GDP, well below the EU average of 0.05% in 2008). The *Innovation Union Scoreboard 2011* report notes that in relation to Ireland a strong decline was observed among SMEs collaborating with others. The report points out that the share of SMEs in Ireland collaborating with others has decreased with more than 10% annually.

A number of support initiatives have been undertaken by the State development agencies to develop more linkages between the enterprise and higher education sectors and include the Innovation Voucher initiative which has proved successful in developing collaborations between small enterprises and knowledge producers in the higher education institutions.

Low absorptive capacity of indigenous SMEs
Studies have shown that indigenous SMEs have a lower innovation absorptive capacity. A report by Forfás, *Analysis of Ireland's Innovation Performance* (2011), indicates that small indigenous enterprises had low levels of co-operation arrangements and thus may not be benefitting fully

6 Innovation Union Competitiveness Report 2011
http://ec.europa.eu/research/innovation-union/index_en.cfm?section=competitiveness-report&year=2011

7 Innovation Union Scoreboard 2011
http://ec.europa.eu/enterprise/policies/innovation/facts-figures-analysis/innovation-scoreboard/index_en.htm

from positive externalities arising from close proximity to innovative foreign-owned enterprises. The report also found that the contribution to turnover of new-to-firm and new-to-market innovations was below EU average.

A previous Forfás report, *Making Technological Knowledge Work* (2005), indicated that in relation to innovation activities SMEs rely extensively on human capital — especially in the form of graduates — as a mechanism for acquiring external know-how and they also tend not to develop or systemise routines for identifying innovation opportunities or realising the value of external knowledge.

Considerable focus has been placed within the Irish education system on the development of fourth level education i.e. the provision of graduate education, particularly structured PhD courses (programmes that preserve the PhD's traditional strengths and embed activities that support the acquisition of a range of relevant specialist and generic skills).

The Programme for Government, *Government for National Recovery 2011-2016*, noted that there was a critical gap between basic research promoted and funded by Science Foundation Ireland and third level institutions and its subsequent development into commercial opportunity for investors can only be closed by making new technologies 'investment ready'. The Government is supporting the development of a network of Technology Research Centres focused on applied technological research in specific areas, to be linked to appropriate higher education institutions. The centres seek to accelerate exploitation of new technologies by providing infrastructure that bridges the gap between research and technology commercialisation.

A report from the Advisory Council for Science, Technology and Innovation has recommended the introduction of Research and Technology Organisations over time to, inter alia, assist SMEs in relation to nearer to market activities.

Lack of clarity and consistency of national IP regime

The report of the Innovation Taskforce, *Innovation Ireland* (2010), indicated that there was confusion amongst both industry and HEIs around national policy in respect of the terms that apply to HEI-industry research and access rights to HEI IP. The report noted that industry needed predictability around these issues and the current system of IP does not facilitate smooth collaboration between MNCs and HEIs.

The report said that Ireland had an opportunity to be one of the few locations in the world for which there was clear, fair and unambiguous operating procedures for State supported IP.

The Programme for Government, *Government for National Recovery 2011-2016*, committed the Government to the development of a national IP protocol to give predictability about the terms on which the enterprise sector can access IP created in HEIs and the wider digital sector.

In 2012, the Government published a new National Intellectual Property Protocol which seeks to assist the enterprise sector to access the research done in Ireland's universities, institutes of technology and other public research institutions.

A key recommendation of the report centres around the development of a 'one stop shop' for businesses seeking to use IP deriving from publicly funded research. This will be achieved through the establishment of a 'central Technology Transfer Office' to provide an effective interface between industry and the research community and which will also drive a world-class

technology transfer system in Ireland, ensuring it is responsive to the needs of both industry and academia.

Other key recommendations from the IP Protocol, such as the use of standardised IP terms and enhanced IP management practices, will support both industry parties and research performing organisations in making their commercial negotiations faster, more consistent and more transparent.

Insufficient early-stage Venture Capital Funding

Weaknesses in relation to venture capital were raised in the Innovation Taskforce's report in 2010. The report highlighted that despite recent investments by Enterprise Ireland in seed capital funding there was insufficient early stage funding through both the public and private sectors in Ireland. Additionally, the report stressed the importance of developing business angel funding and also recommended changes to the Business Expansion Scheme and the Seed Capital scheme.

The *Innovation Union Scoreboard 2011* report noted that while Ireland performed reasonably well compared to the EU average in relation to early stage venture capital in 2009, it scored below the EU average in terms of availability of investment in venture capital at expansion and replacement phase. The report also stated that in terms of availability of credit for private firms, Ireland (2.17%) was one of a small number of Member States with a score above the EU average of 1.27% of GDP.

The government has moved to address the weakness in venture capital funding through the establishment of Innovation Fund Ireland initiative and through proposed changes to the Business Expansion Scheme.

The *Innovation Union Scoreboard 2011* report states that Ireland belongs to a group of countries, which it terms "innovation followers', including Austria, Belgium, Cyprus, Estonia, France, the Netherlands, Slovenia and the UK showing a performance close to that of the EU27 average. Ireland scores well on most research and innovation indicators but less well in terms of the level of inventiveness of the economy as measured by the number of PCT patents, which falls short in comparison to the EU or other similar systems.

HUMAN RESOURCES	
New doctorate graduates (ISCED 6) per 1000 population aged 25-34	1.4
Percentage population aged 25-64 having completed tertiary education	35.9
Open, excellent and attractive research systems	
International scientific co-publications per million population	886
Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country	14.4
Finance and support	
R&D expenditure in the public sector as % of GDP	0.65 (2011)
FIRM ACTIVITIES	
R&D expenditure in the business sector as % of GDP	1.17 (2011)
Linkages & entrepreneurship	
Public-private co-publications per million population	25.8
Intellectual assets	
PCT patents applications per billion GDP (in PPS€)	2.63
PCT patents applications in societal challenges per billion GDP (in PPS€) (climate change mitigation; health)	0.76
OUTPUTS	
Economic effects	
Medium and high-tech product exports as % total product exports	49.4
Knowledge-intensive services exports as % total service exports	70.5
License and patent revenues from abroad as % of GDP	0.76

Data Source: Innovation Union Scoreboard 2011

4. ASSESSMENT OF THE NATIONAL INNOVATION STRATEGY

4.1 National research and innovation priorities

Research and development is a key target of Ireland's updated *National Reform Programme* and a headline target in the NRP is to improve the conditions for research and development, in particular with the aim of raising combined public and private investment levels in this sector to 2.5% of GNP (approximately equivalent to 2.0% of GDP).

Ireland's *National Recovery Plan 2011-2014*, which has been endorsed by the EU Commission and the IMF, notes that strategic R&D investment is one of the Government's infrastructure investment priorities and to that end includes a range of actions to support innovation in the economy, drawing in particular on the recommendations of the Innovation Taskforce, Innovation Ireland (2010), with a strong emphasis on commercialisation of research and supporting start-up enterprises.

One of the main areas of focus of policy-makers is to make the Irish research and innovation system more efficient and effective and in the context of scarce Government finances to allocate resources at areas more likely to deliver economic and social benefit for Ireland.

Previous national research and innovation priorities were concerned with the development of research capacity and infrastructure. Ireland's first — and still current — multiannual R&D strategy document was the *Strategy for Science, Technology and Innovation 2006-2013* (SSTI) which has a large focus on the continued development of the science base; two of its key metrics concern the doubling the number of PhDs and the composition of research teams. Current policy documents acknowledge that the economic crisis has largely overtaken the achievement of targets set in the SSTI.

The economic situation with the concomitant pressures on Government finances and rising unemployment have shifted the focus of policy-makers to the commercialisation of publicly-funded research with the view to maximising the economic benefits to society, particularly in terms of job maintenance and creation. Thus, while the focus is still on funding research excellence, projects must now demonstrate the downstream societal and financial impact of the research.

Considerable research and innovation system attention and resources are being devoted to the implementation of the Government's research prioritisation strategy which was published in March 2012. Fourteen priority areas were identified by a high-level research prioritisation steering group on which the Government should focus its allocation of competitive public funding for R&D over the next 5 years with an explicit emphasis on prioritising research that can achieve commercial outcomes within a reasonable timescale and for that research to be valorised accordingly.

The Government's *Action Plan for Jobs 2012* reiterates that science, technology and innovation is at the heart of enterprise and jobs policies so that Ireland would be favourably positioned to capitalise on the opportunities that will arise as the global economy recovers.

The key aims of the Action Plan, in addition to the prioritisation of research funding across areas which will yield employment opportunities, include:

- assisting the commercialisation of research into specific goods and services which underpin employment, through licensing of technology to existing companies (indigenous and multinational), and through the development of High Potential Start Ups with real growth potential;
- ensuring effective collaboration led by enterprise in undertaking research, development and innovation;
- improving the performance of enterprises engaged in collaboration in winning new markets through the effective absorption of new technology into their businesses;
- pursuing funding and other opportunities under EU Horizon 2020 for specific sectoral activities of national importance;
- the placement of research personnel in Irish-based enterprises to enhance their development capability.

The Action Plan emphasises the need to accelerate the delivery of economic outcomes from Government investment in research and innovation, and lists a number of actions that it will take in 2012 including the enacting of legislation to allow Science Foundation Ireland to fund applied research, adopt a new approach to funding research centres and implement improvements to the R&D tax credit scheme.

The Action Plan also highlights the importance of implementing a national Intellectual Property protocol, which the Government in its programme for government, *Government for National Recovery 2011-2016*, stated was necessary in order to give predictability about the terms on which the enterprise sector could access IP created in HEIs and the wider digital sector.

The Government's research and innovation priorities are not limited to the enterprise and higher education sectors. There is now a renewed focus on public sector innovation, particularly organisational innovation. The Government's Public Service Reform strategy document, *Public Services Reform*, published in November 2011, highlights the expectation by citizens and businesses of a public sector whose service delivery is continually improving. The strategy document notes that innovation, flexibility and the delivery of streamlined services must be at the heart of a reformed Public Service.

4.2 Evolution and analysis of the policy mixes

The economic crisis has and is continuing to impact on national research and innovation policies. Fiscal constraints and high levels of unemployment have led to the development of policies which place a higher emphasis on commercialisation of publicly funded research as a means for creating wealth and jobs. This has led to a re-focusing of research funding to projects that can demonstrate not only research excellence but also a societal and financial impact in the medium term.

This re-focusing of research and innovation policy is also evident in the Government's new research prioritisation strategy that has identified 14 priority areas for future competitive public

research funding. These priority areas have been selected as having the potential to deliver social and economic benefit for Ireland. The research prioritisation strategy when fully implemented will lead to the development of action plans covering the research spectrum for each of the 14 priority areas and may also result in research funding agencies developing complementary funding strategies. However, given the policy focus on funding research projects having a societal and financial impact the funding emphasis is likely to be on closer-to-market research. In 2012, the Government published a bill to change the legal remit of Science Foundation Ireland to, *inter alia*, allow it to fund applied research.

While Irish research and innovation policy has always been concerned with developing closer relationships between education and enterprise, this has now moved up in terms of priority. The development of closer ties between the two sectors is seen as important in order to bring about the transfer of knowledge from the higher education institutions to enterprises so as to assist in the creation of wealth and employment.

In 2012, the Government published a new national Intellectual Property Protocol. It sets out the Government's policies to encourage industry — from start-ups and small and medium enterprises to multinational corporations — to benefit from the research and development done in Ireland's public research institutions. It also describes the practical arrangements for accessing the research.

The new IP Protocol complements the Research Prioritisation Strategy and is part of a suite of actions being taken by the Government to enhance the economic return from State investment in research, such as:

- The introduction of legislative changes to extend the remit of Science Foundation Ireland,
- continued support for a network of industry-led Technology Centres, to encourage industry and academia to work together to develop and commercialise research ideas, and
- the continued development of venture capital supports to support companies taking new opportunities to market

Additionally, while industrial policy has traditionally had a large FDI component, the emphasis has changed with a large focus on attracting multinational companies to locate R&D projects in Ireland. R&D FDI projects are perceived as more likely to lead to the development of deeper roots in Ireland. The Government attaches great importance to the R&D tax credit and has made a number of changes to this tax incentive to increase its attractiveness to multinational companies. The take-up of the R&D tax credit has increased from €145m in 2008 to over €200m in 2010 (the latest year for which data are available) making it one of the largest support measures in the research and innovation budget.

The Government has given a commitment to make the R&D tax credit — subject to a cost-benefit analysis — more attractive and accessible to SMEs.

Route 1: Efforts to promote the establishment of new, domestic R&D performing firms	The Programme for Government points to a renewed focus on encouraging new R&D performing start-up companies. One such priority action is to support the indigenous digital game industry by setting aside funding from Innovation Fund Ireland for a seed capital scheme for Irish digital gaming start-ups and promoting Ireland as digital gaming hub. The Innovation Fund Ireland is a major Government initiative to further develop the provision of seed/venture capital funds to Irish firms and involves a partnership with a number of private sector venture capital funds in creating a funding pool for investing in new start-ups. Despite calls from stakeholders including Forfás, the Government has yet to publish a statement on entrepreneurship strategy.
Route 2: Efforts to stimulate greater R&D investment by R&D performing firms	Stimulating existing R&D performing firms to increase their research and innovation expenditure is a major priority for Enterprise Ireland, the national agency responsible for the development of indigenous firms, and IDA Ireland, the national agency responsible for foreign direct investment. Enterprise Ireland has a suite of support measures to encourage existing firms to do more research and development including the R&D Fund (budget for 2011 estimated at €26m). The 2012 Budget contains measures to make the R&D tax credit more attractive and accessible to small and medium sized enterprises.
Route 3: Efforts to stimulate R&D investment by non-performing firms	The main focus here has been support measures offered by Enterprise Ireland and IDA to target non R&D performing companies to undertake research and innovation activities along with the promotion of awareness of the R&D tax credit facility. Enterprise Ireland runs awareness and training programmes to promote the necessity for firms to undertake research and innovation. The high cost of innovation to small firms in Ireland has been identified by Forfás in a March 2011 report, *Analysis of Ireland's Innovation Performance*, as a weakness in the Irish system and this needs to be addressed by policy-makers. The Forfás report outlined the innovation potential and growth opportunities of encouraging firms to engage in non-technological innovation such as marketing or organisational innovation.
Route 4: Efforts to attract R&D performing firms from abroad	Ireland has been very successful in attracting R&D performing firms from abroad to locate in Ireland. Just under half of the FDI projects attracted into Ireland in 2009 were in the research and innovation category. Ireland's low corporation profits tax is a major attraction as are its R&D tax credit and growing science base in the areas of ICT, biotechnology and sustainable energy. The Government has made a number of changes to the R&D tax credit (this allows companies to claim a 25% tax credit for qualifying incremental R&D expenditure on the cost of in-house qualifying research and development activities undertaken within the European Economic Area) to make it more attractive for companies. The increase in the amount of R&D tax credit claimed by companies from €145m in 2008 to over €200m in 2010 can be used as a proxy indicator of its effectiveness. IDA, the government body responsible for attracting FDI, also has a significant budget (estimated at €83m in 2011) to contribute towards the costs incurred by new firms from abroad in setting up R&D facilities in Ireland as well as the costs incurred by existing foreign owned companies in Ireland.

Route 5: Efforts to increase R&D by stimulating public-private collaboration	The Government in seeking to create exports and employment growth has identified increasing R&D by stimulating public-private collaboration as a key priority. Its priority is to facilitate the transfer of knowledge from the higher education sector to the enterprise sector in order to foster its development into commercial products and services. An initiative which has proved very successful in linking SMEs with knowledge providers in the HEI/PRO sectors is the Innovation Voucher scheme managed by Enterprise Ireland. The number of firms using the scheme increased from 428 vouchers redeemed in 2007 to 518 in 2011 at a cost of €4.1m. Measures to facilitate the transfer of knowledge from the Higher Education Institutions to industry include the publication of a new National Intellectual Property (IP) protocol and a new centralised Technology Transfer Office structure in the higher education sector.
Route 6: Efforts to increase R&D levels in public sector organisations	Investing in the development of a science capacity, particularly in higher education sector, has been a key priority of the Strategy for Science, Technology and Innovation 2006-2013 and has been an important selling point for attracting R&D performing firms from abroad as well as stimulating existing firms in Ireland to engage in research. The main concern is that the pressure to reduce the fiscal deficit is restricting — and will continue to restrict — the provision of funding for research in the higher education and public research organisation sectors. Unless compensated for by increased R&D expenditure in the private sector, this may have a negative impact on Ireland's ambition of achieving its 2.5% GNP (2.0% GDP) target.

4.3 Assessment of the policy mix

An assessment of the Irish research and innovation policy mix must be put in context of the research prioritisation strategy which is at an early stage of its implementation. The execution of the strategy is likely to have far-reaching consequences not only for the 14 priority areas identified by the Research Prioritisation Steering Group but also for the allocation of research funding within these priority areas, with the bulk of the funding likely to be focused on research projects that can demonstrate societal/financial impact.

The report of the Research Prioritisation Steering Group also recommended that the Government should re-state its objectives for science, technology and innovation policy with clear goals and metrics for each element of this policy. 2013 marks the completion of the current national multiannual research and innovation strategy, the Strategy for Science, Technology and Innovation 2006-2013.

Additionally, an assessment of the policy mix must take cognisance of the changing research and innovation governance structure which is in a state of change. A Prioritisation Action Group (PAG) was established in March 2012 to oversee the implementation of the research prioritisation strategy and it has largely superseded existing governance structures established in the context of the Strategy for Science, Technology and Innovation 2006-2013 which while not disbanded have not been as active.

Policies to promote business expenditure on research and development appear to have been effective as evidenced by BERD data which show that, despite the economic slow-down, R&D expenditure levels declined slightly between 2009-2011 though BERD as a percentage of GDP increased fractionally during the period from 1.16% to 1.17%. It should be noted however that 70% of BERD expenditure is accounted for by multinational companies whose products and services are destined for international markets.

Enhancements to the R&D tax credit and the efforts of IDA to attract mobile R&D-related FDI projects to Ireland may have contributed to smaller decline in BERD compared to the decrease in R&D performed by the HEI sector.

Challenges	Policy measures/actions addressing the challenge[8]	Assessment in terms of appropriateness, efficiency and effectiveness
Dual nature of the enterprise sector	R&D tax credit R&D Grants	The take-up of the R&D tax credit by the business sector has increased but its usage by SMEs has been muted. The Government has committed to making the R&D tax credit more attractive and accessible for smaller companies. Exchequer funding restrictions notwithstanding, the Government has maintained research and innovation funding for indigenous SMEs to facilitate them to compete in export markets. There is a need to develop non-technological innovation supports e.g. organisational and market innovation, to address weaknesses in these areas among SMEs. The lack of a national entrepreneurship strategy needs to be addressed.
Low levels of formal collaboration	Technology Centres Industry-Led Research Networks Strategic Research Clusters Centres for Science, Engineering and Technology Innovation Vouchers InterTradeIreland Innova programme Innovation Partnerships Technology Transfer Offices IRC Industry based PhD and Masters Programme	There has been considerable focus on developing support measures to increase linkages between the HEIs and industry in order to assist the transfer of knowledge that can be commercialised by the private sector. These support measures are appropriate given the low levels of formal linkages within the Irish system but it is too early to judge their effectiveness. The Innovation Voucher support measure has been successful in encouraging small enterprises to develop linkages with knowledge providers.
Low absorptive capacity of indigenous SMEs	Network of Technology Centres Fourth level education InterTradeIreland Fusion programme New centralised Technology Transfer Offices structure has been implemented within the HEI sector	The Technology Centres support measure — which replaced the Competence Centres programme — is currently being developed in the technology areas outlined in the Programme for Government such as biotechnology, nanotechnology and high value manufacturing. Further centres are being planned in learning technologies, cloud computing and financial services. A number of Fourth level initiatives have been launched, but it is too early to adjudge their effectiveness.

[8] Changes in the legislation and other initiatives not necessarily related with funding are also included.

Challenges	Policy measures/actions addressing the challenge[8]	Assessment in terms of appropriateness, efficiency and effectiveness
Lack of clarity and consistency of national IP regime	New National Intellectual Property Protocol has been published	New IP protocol was published in June 2012 and it is too soon to assess its effectiveness
Insufficient early-stage Venture Capital funding	Enterprise Ireland Seed and Venture Capital programme Innovation Fund Ireland MicroFinance Fund Credit Guarantee Scheme	The MicroFinance Fund and Credit Guarantee Scheme are new support measures to address issues relating to the lack of credit for SMEs but it is too early to determine whether they will be effective.

Policy areas that might be addressed in the future include initiatives to boost non-technological innovation such as marketing and organisational innovation, particularly among indigenous enterprises. Additionally, there is scope for using public procurement to increase the innovation capacity of SMEs: this was a recommendation of the Innovation Taskforce. Support measures to facilitate the development of inter-firm networks could also help address a structural weakness in the Irish innovation system.

The *Innovation Union Competitiveness Report 2011* points out that Ireland's performance in relation to patents falls short in comparison to the EU and the OECD. Data provided by the World Intellectual Property Organisation indicates that patent applications from Irish residents (including foreign-owned companies operating in Ireland) to the Irish Patents Office in 2011 amounted to 494, down from 733 in 2010. This is an issue that requires further examination by policy-makers.

The high cost of innovation has been cited by Forfás (*Analysis of Ireland's Innovation Performance*, 2011) as a barrier for SMEs and this should also be addressed in future policy responses.

5. NATIONAL POLICY AND THE EUROPEAN PERSPECTIVE

The Government views activities at European level such as trans-national collaborative research, funding of frontier research, support for researcher mobility (trans-national and inter-sectoral) and careers, measures to enhance knowledge transfer and initiatives to facilitate the tackling of important societal challenges, as contributing directly to the achievement of national research and innovation policy objectives as set out in national strategy documents such as the Programme for Government, *Government for National Recovery 2011-2016*.

The Government has indicated that the activity stimulated in Ireland through its investments in national STI initiatives can contribute to the collective effort to strengthen the European research and innovation system. National activities are perceived as supporting and underpinning European objectives whilst also leveraging international funds and alliances thereby enabling the Framework Programmes to complement the national research framework.

Ireland's research and innovation agenda and priorities are completely in tune with the EU's Europe 2020 strategy for jobs and growth. A key part of this strategy will be Horizon 2020, the successor for Framework Programme 7. Horizon 2020 is the financial instrument, running from 2014 to 2020 with an indicative €80 billion budget, for the EU's new programme for research and innovation and a key part of the drive to create new growth and jobs in Europe. The negotiations on Horizon 2020 will be progressed during Ireland's Presidency of the European Council and finalised by the end of 2013. Irish national research priorities are aligned with those being considered in Horizon 2020 and participation in Horizon 2020 is anticipated to be a key benefit for the SME enterprise sector, and an enabler of jobs in Ireland.

While acknowledging that there is more to the European Research Area than the Framework Programme, the Government believes FP7 offers Irish SMEs, multinational enterprises and research institutions valuable opportunities to participate in high-calibre research collaborations with their European counterparts. Based on the latest data, Ireland is participating in the Framework Programme from a far stronger position than ever before. The Government has agreed that the total share of EU funding to be targeted by Ireland over the lifetime of FP7 should be in the region of €600 million (the original target set in the SSTI was €400m). A national support infrastructure, FP7 Ireland, was established in 2006 to ensure that Ireland gets maximum benefit from FP7.

The *Ireland's Competitiveness Scorecard 2012* report published by the National Competitiveness Council (NCC) reveals Irish researchers were marginally more likely to be successful (19%) than the euro area average (18%) in their applications to FP7. Irish researchers, however, attracted significantly less funding per applicant than leading countries such as Germany, the Netherlands and Denmark. Of the funding won to date, 25 per cent went to companies (74 per cent of whom were SMEs), 61 per cent went to higher education institutions, and the remaining 13 per cent went to public bodies and research performing organisations. The NCC indicates that based on performance to date Ireland is on course to achieving its €600m draw down target by 2013.

Policy-makers point to Ireland's participation in 8 out of the 10 Joint Programming Initiatives (with observer status in another JPI) as evidence of its commitment to tackling common challenges at a European level.

The Government has signalled its intention to promote Ireland's full engagement with the Innovative Union proposals issued by the European Commission in October 2010 as one of the seven flagship initiatives under EU2020 Strategy, with the specific aim of refocusing R&D and innovation policy on major challenges and at turning inventions into products.

Key elements of Ireland's policy mix reflect the ERA agenda such as the development of human resources and research infrastructures. In the case of the latter, the fifth and current cycle of the Programme for Research in Third Level Institutions which primarily funds the development of research facilities has been influenced by the ESFRI road-map. Additionally, the Higher Education Authority has carried out a survey of large items of research equipment in the Irish higher education sector. The outputs of the survey will form the basis for a national Large Item of Research Equipment database which is being developed by the HEA and the outputs of the FP7-funded MERIL project[9] which aims to map research infrastructures of EU relevance.

The facilitation of researcher career paths and mobility is a key policy objective of the Commission's ERAWATCH Communication, *A Reinforced European Research Area Partnership for Excellence and Growth*, and Ireland has been to the forefront in implementing the "Scientific Visa" arrangement. Irish policy has put considerable emphasis on the career development of researchers and the Programme For Research In Third Level Institutions (PRTLI) has funded a number of structured PhD initiatives.

Ireland is also committed to the concept of open access; a number of funding organisations such as SFI and HRB have adopted policies in relation to encouraging the open access availability of published research that they fund. A number of data repositories have been funded by the PRTLI.

A number of measures are being considered with a view to fostering transnational STI co-operation. As noted above, the Government has published the bill to extend the legal remit of Science Foundation Ireland that will allow it to fund research projects in Northern Ireland and, where appropriate, in the countries of the European Economic Area or such other countries that may be designated. Additionally, the Government in conjunction with SFI is examining more cost-effective ways of forming STI alliances with third countries.

9 The MERIL database portal is still in development. A test portal can be accessed here: http://portal.meril.eu/converis-esf/publicweb/startpage

REFERENCES

Advisory Council for Science, Technology and Innovation (2012): *Sustainability of Research Centres*, Dublin, Ireland.

Central Statistics Office (2011): *Business Expenditure on Research and Development 2009/2010*, Dublin, Ireland.

Department of Finance (2010): *National Recovery Plan 2011-2014*, http://budget.gov.ie/The%20National%20Recovery%20Plan%202011-2014.pdf

Department of Jobs, Enterprise and Innovation (2012): *Putting public research to work in Ireland*, Dublin, Ireland http://www.djei.ie/publications/science/2012/Intellectual_Property_Protocol_Putting_Public_Research_to_Work_for_Ireland.pdf

Department of Jobs, Enterprise and Innovation (2012): *Report of the Research Prioritisation Steering Group*, Dublin, Ireland.

Department of Public Expenditure and Reform/Central Expenditure Evaluation Unit (2012), *Labour Market Activation and Training* http://per.gov.ie/wp-content/uploads/Labour-Market-Training-and-Activation.pdf

Department of the Taoiseach [Prime Minister] (2010): *Innovation Ireland — The Report of the Innovation Taskforce*, http://www.taoiseach.ie/eng/Innovation_Taskforce/Report_of_the_Innovation_Taskforce.pdf

Department of the Taoiseach (2012): *National Reform Programme for Ireland 2012: Update under the Europe 2020 Strategy*, Dublin, Ireland.

EU Commission (2012): *A Reinforced European Research Area Partnership for Excellence and Growth*, Brussels. COM(2012) 392 final.

European Union (2012): *Innovation Union Scoreboard 2011*, Pro Innno Europe.

European Union/Joint Research Centre of the European Commission (2012): *The 2012 EU Industrial R&D Investment Scoreboard*, Luxembourg: Publications Office of the European Union.

European Union/Joint Research Centre of the European Commission (2012): *The 2012 EU Survey on R&D Investment Business Trends*, Luxembourg: Publications Office of the European Union.

Forfás (2011): *Analysis of Ireland's Innovation Performance*, http://www.forfas.ie/publication/search.jsp?ft=/publications/2011/Title,7615,en.php

Forfás (2005): *Making Technological Knowledge Work — A Study of the Absorptive Capacity of Irish SMEs*, http://www.forfas.ie/media/forfas050315c_making_tech_knowledge_work.pdf

Forfás (2011): *Analysis of Ireland's Innovation Performance*, http://www.forfas.ie/media/forfas110323-Analysis_of_Irelands_Innovation_Performance.pdf

Government of Ireland (2011): *Programme for National Government 2011-2016,* Dublin, Ireland.

Government of Ireland (2012): *Action Plan for Jobs 2012*, Dublin, Ireland.

Martin, T (2011): *ERAWATCH Country Report 2011 — Analysis of policy mixes to foster R&D investment and to contribute to the ERA: Ireland report*, http://erawatch.jrc.ec.europa.eu/erawatch/export/sites/default/galleries/generic_files/file_0185.pdf

Martin, T (2010): *ERAWATCH Country Report 2010 — Analysis of policy mixes to foster R&D investment and to contribute to the ERA: Ireland report*, http://erawatch.jrc.ec.europa.eu/erawatch/export/sites/default/galleries/generic_files/X04-CR-2010-IE.pdf

Martin, T (2009): *ERAWATCH Country Report 2009 — Analysis of policy mixes to foster R&D investment and to contribute to the ERA: Ireland report*, http://erawatch.jrc.ec.europa.eu/erawatch/export/sites/default/galleries/migration_files/PMCR-Ireland_Full.pdf

Martin, T (2008): *ERAWATCH Country Report 2008 — An assessment of research system and policies: Ireland report*, http://erawatch.jrc.ec.europa.eu/erawatch/export/sites/default/galleries/migration_files/JRC50608IE.pdf

LIST OF ABBREVIATIONS

ACSTI	Advisory Council for Science, Technology and Innovation
BERD	Business Expenditure on Research and Development
BMW	Border, Midland and Western Region
CSET	Centres for Science, Engineering and Technology
CSO	Central Statistics Office
cTTO	Centralised Technology Transfer Office
DES	Department (Ministry) of Education and Skills
DJEI	Department (Ministry) of Jobs, Enterprise and Innovation
DSE	Discover Science and Engineering
EEA	European Economic Area
EI	Enterprise Ireland
ERA	European Research Area
FTE	Full time equivalent
GBAORD	Government Budget Appropriations or Outlays for R&D
GDP	Gross Domestic Product
GERD	Gross Expenditure on Research and Development
GNP	Gross National Product
HEA	Higher Education Authority
HEI	Higher education institutions
HERG	Higher Education Research Group
HRB	Health Research Board
IDA	IDA Ireland
IMF	International Monetary Fund
IRC	Irish Research Council
IRCHSS	Irish Research Council for the Humanities and Social Sciences
IRCSET	Irish Research Council for Science, Engineering and Technology
MNC	Multinational Company
NDP	National Development Plan
NRP	National Reform Programme
NRPE	National Research Prioritisation Exercise
OECD	Organisation for Economic Co-operation and Development
PAG	Prioritisation Action Group
PRTLI	Programme For Research In Third Level Institutions
R&D	Research and Development
RI	Research Infrastructure
RIS^3	Research and Innovation Strategies for Smart Specialisation
RTO	Research and Technology Organisation
S^3 Platform	Smart Specialisation Platform
S&E	Southern and Eastern Region
SFI	Science Foundation Ireland
SSTI	Strategy for Science, Technology and Innovation 2006-2013
STI	Science, Technology and Innovation
VC	Venture capital

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Abstract
This analytical country report is one of a series of annual ERAWATCH reports produced for EU Member States and Countries Associated to the Seventh Framework Programme for Research of the European Union (FP7). The main objective of the ERAWATCH Annual Country Reports is to characterise and assess the performance of national research systems and related policies in a structured manner that is comparable across countries.
The Country Report 2012 builds on and updates the 2011 edition. The report identifies the structural challenges of the national research and innovation system and assesses the match between the national priorities and the structural challenges, highlighting the latest developments, their dynamics and impact in the overall national context. They further analyse and assess the ability of the policy mix in place to consistently and efficiently tackle these challenges. These reports were originally produced in December 2012, focusing on policy developments over the previous twelve months.
The reports were produced by independent experts under direct contract with IPTS. The analytical framework and the structure of the reports have been developed by the Institute for Prospective Technological Studies of the Joint Research Centre (JRC-IPTS) and Directorate General for Research and Innovation with contributions from external experts.

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Working in close cooperation with policy Directorates-General, the JRC addresses key societal challenges while stimulating innovation through developing new standards, methods and tools, and sharing and transferring its know-how to the Member States and international community.

Key policy areas include: environment and climate change; energy and transport; agriculture and food security; health and consumer protection; information society and digital agenda; safety and security including nuclear; all supported through a cross-cutting and multi-disciplinary approach.

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